Affirmation of Personal Values Buffers Neuroendocrine and Psychological Stress Responses

J. David Creswell, William T. Welch, Shelley E. Taylor
University of California, Los Angeles

David K. Sherman
University of California, Santa Barbara

Tara L. Gruenewald and Traci Mann
University of California, Los Angeles

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Contact Author: J. David Creswell, UCLA Department of Psychology, Franz Hall, Box 951563, Los Angeles, CA 90095-1563, creswell@ucla.edu (Phone #: 310-770-9024)
Abstract

Stress is implicated in the development and progression of a broad array of mental and physical health disorders. Theory and research on the self suggests that self-affirming activities may buffer these adverse effects. This study experimentally investigated whether affirmations of personal values attenuate physiological and psychological stress responses. Eighty-five participants completed either a value affirmation task or a control task prior to participating in a laboratory stress challenge. Participants who affirmed their values had significantly lower cortisol responses to stress, compared to control participants. Dispositional self-resources (e.g., trait self-esteem and optimism) moderated the relationship between value affirmation and psychological stress responses, such that high self-resource participants who had affirmed personal values reported the least stress. These findings suggest that reflecting on personal values can keep neuroendocrine and psychological responses to stress at low levels. Implications for research on the self, stress processes, and health and for interventions are discussed.
Affirmation of Personal Values Buffers Neuroendocrine and Psychological Stress Responses

Stress is implicated in the development and progression of a broad array of pathological conditions. These include psychological disorders, such as depression and anxiety (Alonso, Griefel, Pavone, Stemmelin, Le Fur, & Soubrie, 2004; Charney & Manji, 2004), as well as medical disorders, including coronary heart disease, hypertension, and diabetes (McEwen & Seeman, 1999). Although not all the mechanisms connecting stress to these outcomes are known, chronic threats can affect the functioning of the body’s stress systems, namely the sympathetic-adrenomedullary (SAM) axis and the hypothalamic-pituitary-adrenocortical (HPA) axis in ways prognostic for or related to these disorders (McEwen, 1998).

In response to threat, the SAM system coordinates the release of catecholamines, which triggers increases in heart rate and blood pressure, among other changes, and the HPA axis coordinates the release of glucocorticoids, including cortisol. Although activation of these stress systems facilitates short-term “fight or flight” responses to threats, prolonged or recurrent activation can compromise the resilience of these systems, laying the groundwork for chronic mental and physical health disorders (McEwen, 1998). Accordingly, identifying resources that may mute the psychological and biological impact of stress is an important research priority with implications for mental and physical health.

Theories of the self, including self-affirmation theory (Steele, 1988) and cognitive adaptation theory (Taylor, 1983), have posited that affirmation or enhancement of the self can buffer an individual against the adverse effects of stress. Several lines of research support this prediction. On the biological side, Taylor, Lerner, Sherman, Sage and McDowell (2003a) found
that individuals who chronically enhance their personal qualities, relative to others, had lower basal cortisol levels and lower cardiovascular responses to a laboratory challenge (see also Seery, Blascovich, Weisbuch & Vick, 2004). On the psychological side, affirmations of personal values can attenuate perceptions of threat (Sherman & Cohen, 2002; Steele 1988; Keough, 1998), reduce rumination after failure (Koole, Smeets, van Knippenberg, & Dijksterhuis, 1999), and reduce defensive responses to threatening information (Sherman, Nelson & Steele, 2000).

The primary goal of the present investigation was to test whether an intervention involving reflection on personal values (Steele, 1988) could buffer physiological and psychological stress responses during a laboratory stress challenge. A secondary goal was to examine whether dispositional self-resources moderate the effect of value affirmation on stress responses. Although previous research has found that dispositional self-resources can be stress-protective (e.g., Taylor et al., 2003a; 2003b), no experimental studies have examined whether a manipulation designed to recruit self-relevant resources has these beneficial effects.

Method

Participants and Design

Eighty-five undergraduates (35 males, 50 females) participated in the study for course credit or $30 dollars. Participants ranged in age from 17 to 33 (\(M=19.57\)). Participants identified themselves as Asian (56%), Caucasian (21%), Latino/a (6%), or other (17%). During recruitment, participants were screened and excluded from the study if they had preexisting health conditions (e.g., hypertension, diagnosed mental health problems) or engaged in health behaviors that could affect cortisol levels (e.g., use of oral contraceptives). On the day of the study, participants were asked to refrain from activities that affect cortisol levels (e.g., smoking, drinking caffeine). All procedures were IRB approved.
Prior to the study, participants completed informed consent forms, a health screening instrument, and measures assessing self-resources on the study website. These measures included the Rosenberg Self-Esteem Scale (RSES), a 10-item assessment of global feelings of self-worth ($\alpha=.68$) (Rosenberg, 1965); the How I See Myself Questionnaire (HSM), a 40-item questionnaire assessing the tendency to self-enhance ($\alpha=.91$) (Taylor & Gollwitzer, 1995); and the Life Orientation Test (LOT), a 10-item questionnaire assessing dispositional optimism ($\alpha=.84$) (Scheier, Carver, & Bridges, 1994). Website assessments were completed at least 24 hours before the study to reduce carry-over effects.

To control for the circadian rhythm of cortisol (Kudielka, Schommer, Hellhammer, & Kirschbaum, 2004), experimental sessions were scheduled between 2:30 and 7:30pm. Upon arrival at the laboratory, participants completed a “Values Questionnaire” (Allport, Vernon, & Lindzey, 1960), which defines five personal values (religion, social issues, politics, theory, and aesthetics). Participants rated and rank-ordered these values according to their personal importance.

Participants were then fitted with a blood pressure cuff, and heart rate and blood pressure were assessed every two minutes by a Critikon automatic sphygmomanometer (Dinamap Model 8146). Following a 10-minute acclimation period, participants provided a baseline saliva sample for the assessment of cortisol levels.

Participants listened to audio-taped instructions explaining the tasks. We employed the Trier Social Stress Task (TSST), a widely-used challenge (Kirschbaum, Pirke, & Hellhammer, 1993) that involves a speech task and mental arithmetic. Participants were instructed to prepare a speech on “why I would be a good candidate for an administrative assistant position at UCLA,” a competitive and desirable student position.
Participants were randomly assigned either to the value affirmation condition or to a control condition. In both conditions, they completed a questionnaire that elicited their thoughts and feelings about one of the values they had rated. Participants indicated their agreement or disagreement with each value-relevant item, by assigning 0-3 points to each of the answer choices; more points reflected greater endorsement of the value. For example, for the political value, participants answered questions such as: “Assuming that you have sufficient ability, would you prefer to be: (a) a banker (b) a politician?” Value affirmation participants answered questions relating to top-ranked value, whereas control condition participants answered questions relating to their fifth-ranked value.

Participants then mentally prepared their speech and completed a four-item pre-speech measure in which they rated how stressful they expected the two tasks to be and their ability to cope with each task, on 7-point scales (α=.73) (Blascovich & Tomaka, 1996). The experimenter then exited, and two speech evaluators (i.e., confederates who were trained to act in a stern, non-accepting manner) entered the laboratory to direct the stress tasks. Participants delivered their five-minute speech and then counted aloud backwards from 2,083 by 13’s for 5-minutes under harassing conditions. Specifically, participants were asked to “go faster” at one minute intervals.

Participants then rested, and 20 minutes post-stress onset, they provided a saliva sample. They completed a three-item post-stress measure, rating how stressful, threatening, and difficult the tasks were on 7-point scales (α=.75). Two more saliva samples were collected at 30-minutes and 45-minutes post-stress onset. The participant was then debriefed and dismissed.

Cortisol samples were immediately frozen and shipped on dry ice in a single batch to a laboratory in Dresden Germany, for analysis. Salivary cortisol levels were measured using a
time-resolved immunoassay with fluorometric end point detection (Dressendorfer, Kirschbaum, Rohde, Stahl, & Strassburger, 1992). All samples were assayed in a single batch.

Results

Manipulation Check
As a manipulation check, total points assigned to the rated value were summed. Participants in the value affirmation condition assigned significantly more points ($M=17.29$) to the value they rated than control participants ($M=10.26$), $t(77)=6.79$, $p<.0001$. However, five participants failed the manipulation check, assigning total points comparable to the alternative condition. They were excluded from further data analysis.

Effects of Stress Tasks on Physiological Stress Response
Independent samples t-tests showed no condition differences on baseline levels of cortisol, HR, SBP, or DBP. To normalize the data, cortisol measures were log-transformed prior to statistical analysis.

Preliminary analyses confirmed that the stress tasks produced acute physiological stress responses. A paired-samples t-test comparing baseline cortisol levels to cortisol levels 20-minutes post-stress onset showed a significant increase ($t(71)=3.39$, $p=.001$). Paired samples t-tests comparing baseline HR, systolic blood pressure (SBP), and diastolic blood pressure (DBP) with average values during the stress tasks showed significant increases in HR ($t(73)=12.53$, $p<.001$), SBP ($t(72)=17.58$, $p<.001$), and DBP ($t(72)=17.20$, $p<.001$).

Analytic Strategy
We tested the primary hypothesis that value affirmation reduces stress responses by conducting repeated measures ANCOVAs with baseline values for each physiological measure entered as a covariates and affirmation status (value affirmation vs. control) entered as a
between-subjects factor. We tested the secondary hypothesis that this relationship would be moderated by self-resources by computing a self-resources variable from the measures of self-esteem (RSE), self-enhancement (HSM), and optimism (LOT). Principal axis factor analyses using promax rotation revealed a one-factor solution that accounted for 64.28% of the variance (factor loadings: RSES=.91; HSM=.72; LOT=.77). This “Self-Resources” variable was entered as a continuous moderating predictor variable in a series of multiple regression equations testing the effect of value affirmation on stress responses. All predictor variables were centered prior to being entered in the regression models (Cohen, Cohen, West, and Aiken, 2003).

**Effects of Value Affirmation on Neuroendocrine Stress Responses**

Repeated measures ANCOVAs tested for condition differences in cortisol responses to stress. As predicted, participants in the value affirmation condition had significantly lower cortisol responses to the stress task than controls, controlling for basal cortisol levels ($F(1,64)=4.80, p=.03$) (see Figure 1). Pairwise comparisons at each time point showed that value affirmation participants had significantly lower cortisol responses at 20 minutes post-stress onset ($M_{\text{difference}}=.14, p=.041$), at 30 minutes post-stress onset ($M_{\text{difference}}=.14, p=.047$), and at 45 minutes post-stress onset ($M_{\text{difference}}=.14, p=.024$), controlling for basal cortisol levels. Additionally, paired t-tests that tested for significant changes from baseline to 20 minutes post-stress onset revealed that control participants had significant increases in cortisol ($t(32)=4.49, p<.0001$), whereas value affirmation participants did not ($t(38)=.85, p=.40$); thus, the stress tasks elicited significantly elevated cortisol responses in only the control group. Repeated measures ANCOVAs showed that self-resources did not moderate this pattern (comparing low and high self-resources participants using a median split). Specifically, the self-resources X condition interaction was not significant ($F(1,53)=1.42, p=.24$).
Effects of Value Affirmation on Physiological Stress Responses

Repeated measures ANCOVAs tested for condition differences in cardiovascular responses to stress and during recovery. The results suggest that both conditions experienced similar degrees of cardiac reactivity during the stress tasks, as no significant condition differences were found on HR ($F(1, 68) = .11, p = .74$), SBP ($F(1, 66) = .243, p = .62$), and DBP ($F(1, 66) = 1.89, p = .17$) during stress and recovery. Pairwise comparisons during the stress tasks showed no differences between conditions on HR ($M_{\text{difference}} = .98, p = .70$), SBP ($M_{\text{difference}} = -.59, p = .83$), and DBP ($M_{\text{difference}} = 2.16, p = .21$). Similarly, no significant differences were found during the 10-minute recovery period on HR ($M_{\text{difference}} = .17, p = .89$), SBP ($M_{\text{difference}} = 2.60, p = .14$), and DBP ($M_{\text{difference}} = 1.36, p = .22$). Similar to the cortisol findings, no self-resources X condition interactions were found for HR ($F(1, 56) = .08, p = .81$), SBP ($F(1, 54) = .44, p = .51$), and DBP ($F(1, 54) = 2.53, p = .12$).

Effects of Value Affirmation on Psychological Stress Responses

To examine whether participants who affirmed personal values had lower perceptions of stress, we conducted one-way ANOVAs on the psychological stress measures. No significant differences were found between the value affirmation and control groups on pre-task stress appraisals ($F(1, 63) = .18, p = .68$) or on post-task stress ratings ($F(1, 73) = .08, p = .72$).

Consistent with past studies showing that self-resources can buffer against stress (Taylor et al., 2003a), a significant main effect for self-resources was found on the psychological stress response measures. Participants with more self-resources had lower pre-task stress appraisals ($\beta = -.63, t(55) = -4.25, p < .001$) and lower stress perceptions after the stress tasks ($\beta = -.48, t(63) = -2.96, p = .004$).
Moreover, self-resources moderated the effect of value affirmation. Specifically, a significant self-resource X condition interaction was found on pre-task stress appraisals, $\beta = .34$, $t(55)=2.26$, $p=.03$. Simple slopes tests showed that increases in self-resources were associated with lower stress appraisals in the value affirmation condition, $\beta=-.67$, $t(28)=-4.685$, $p<.001$, but not in the control condition, $\beta=-.06$, $t(26)=-.28$, $p=.78$ (See Figure 2). Similarly, on stress perceptions following the stress tasks, the self-resources X condition interaction was significant, $\beta=.38$, $t(63)=2.34$, $p=.02$. Simple slopes tests (see Figure 3) showed that self-resources were associated with lower stress perceptions in the value affirmation condition, $\beta=-.48$, $t(34)=-3.17$, $p=.003$, but not in the control condition, $\beta=.10$, $t(28)=.52$, $p=.61$ (See Figure 3). Thus, self-resources moderated the impact of value affirmation on psychological stress responses.

Discussion

The present study provides the first evidence that an experimental intervention involving the affirmation of personal values can buffer neuroendocrine and psychological stress responses. Specifically, value affirmation participants had significantly lower cortisol responses to the stress tasks, compared to control participants. Furthermore, changes from baseline to peak stress revealed that only control participants had significant stress-related increases in cortisol, suggesting that value affirmation mitigated HPA-axis activation. Value affirmation and control participants had equivalently elevated heart rate responses to the stress tasks, suggesting that participants in both conditions were equally engaged in the tasks (Blascovich & Seery, in press). The pattern of cardiovascular arousal coupled with HPA-axis activation found in the control group is believed to be more health-compromising than cardiovascular arousal only (the pattern found in the value affirmation group) (Blascovich & Mendes, 2000; Dienstbier, 1989).
Consistent with past research (Taylor et al., 2003a; 2003b), positive dispositional self-resources (e.g., self-esteem) were associated with reduced stress appraisals, both before and after the stress tasks. Further, self-resources moderated the relationship between value affirmation and psychological stress responses. Specifically, value affirmation participants high in self-resources reported the least stress, whereas value affirmation participants low in self-resources reported the most stress. These findings suggest that affirmation of personally important values may be most effective in reducing stress in people with a positive dispositional self-concept (i.e., high self-resources), but may exacerbate stress in people with a negative dispositional self-concept (i.e., low self-resources) (cf., Swann, Griffin, Predmore, & Gaines, 1987).

The results are consistent with theories of the self, specifically self-affirmation theory (Steele, 1988) and cognitive adaptation theory (Taylor, 1983), which maintain that the self acts as a buffer against threatening events. The present findings suggest that strong self-resources, especially when coupled with an affirmation of personal values, are protective of psychological reactions to potentially threatening events. Value affirmation alone was sufficient to buffer participants’ neuroendocrine responses to stress and did not depend on dispositional self-resources. This pattern suggests that physiological stress responses may be especially sensitive to the immediate threatening context, consistent with evolutionary arguments underlying the fight-or-flight response, whereas psychological responses to stress may depend more on whether a strong dispositional sense of self can be recruited as a buffer.

From a clinical standpoint, the results imply potential benefits of stress reduction interventions that capitalize on the protective capacities of the self, by introducing value affirmation tasks prior to stressful events or in chronically stressful environments (McEwen,
Clinical treatment practices might also provide patients with opportunities to reflect on other valued aspects of the self.

An important question concerns whether the results have implication for health. Recruiting self-resources, including value affirmations, for managing stressful events, could have cumulative beneficial effects on multiple biological systems (cf., McEwen, 1998). Research with patient populations shows, for example, that men who are HIV seropositive (Reed, Kemeny, Taylor, & Visscher, 1999) and people with heart disease (Helgeson & Fritz, 1999) have less aggressive courses of illness if they have strong self-resources. The present study provides the first experimental evidence for an underlying mechanism that may help to explain these benefits.
Authors’ Notes

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References


Figure Captions

*Figure 1.* Effects of value-affirmation versus control condition on salivary cortisol responses to stress. Vertical lines depict standard errors of the means.

*Figure 2.* Stress appraisal as a function of the interaction of self-resources and value-affirmation. Stress appraisals are shown in standardized units with greater values reflecting higher stress appraisals. +/- 1 SD was used to impute values for low and high self-resources.

*Figure 3.* Post-stress perceptions as a function of the interaction of self-resources and value-affirmation. Post-stress perceptions are shown in standardized units with greater values reflecting higher stress perceptions. +/- 1 SD was used to impute values for low and high self-resources.
Figure 1.
Figure 2.
Figure 3.